

Claims

[c1]

1. A system for the determination of the relative time of arrival of a device transmission, comprising:

(A) a first base station, said first base station further comprising:

(1) an antenna system;

(2) a global positioning system receiver in communication with said antenna system;

(3) a processor in communication with said global positioning system receiver;

(4) an altitude sensor in communication with said processor; and

(5) a reference clock in communication with said processor; and

(B) a program executing on said processor, said program determining the relative time of arrival of said device transmission to said first base station.

[c2]

2. A system for the determination of the relative time of arrival of a device transmission, as recited in claim 1, further comprising a second base station.

[c3]

3. A system for the determination of the relative time of arrival of a device transmission, as recited in claim 2, further comprising a third base station.

[c4]

4. A system for the determination of the relative time of arrival of a device transmission, as recited in claim 3, further comprising a fourth base station.

[c5]

5. A system for the determination of the relative time of arrival of a device transmission, as recited in claim 4, wherein said program executing on said processor, further comprises a time difference of arrival technique receiving time of arrival information from said base stations and calculating the range differences from said transmitting device to said base stations.

[c6]

6. A system for the determination of the relative time of arrival of a device transmission, as recited in claim 5, wherein said time difference of arrival technique further comprises a Euclidian calculation of said range differences.

[c7]

7. A system for the determination of the relative time of arrival of a device transmission, as recited in claim 5, wherein said time difference of arrival technique calculates three-dimensional ranges.

[c8]

8. A system for the determination of the relative time of arrival of a device transmission, as recited in claim 1, wherein said global positioning system synchronizes said base stations to a clock standard.

[c9]

9. A system for the determination of the relative time of arrival of a device transmission, as recited in claim 1, further comprising an error correcting processes.

[c10]

10. A system for the determination of the relative time of arrival of a device transmission, as recited in claim 1, wherein said transmitting device is mobile.

[c11]

11. A system for the determination of the relative time of arrival of a device transmission, as recited in claim 5, wherein said time difference of arrival technique further comprises a triangulation of a location for said transmitting device from three or more relative times of arrival from said transmitting device to said three or more base stations.

[c12]

12. A method for the determination of a mobile transmitting device, comprising:
(A)receiving a signal from said transmitting device to a plurality of base stations;
(B)determining the number of said plurality of base stations, which received, said signal;
(C)triangulating the location of said transmitting device from a plurality of distances between said transmitting device and said plurality of base stations.

[c13]

13. A method for the determination of a mobile transmitting device, as recited in claim 12, wherein said plurality of base stations further comprise:
(1)a GPS receiver;

- (2) a processor in communication with said GPS receiver;
- (3) an altitude sensor in communication with said processor; and
- (4) a reference clock in communication with said processor.

[c14]

14. A method for the determination of a mobile transmitting device, as recited in claim 12, wherein said triangulating further comprises calculating the time distance of arrival of said transmitted signal to said plurality of base stations.

[c15]

15. A method for the determination of a mobile transmitting device, as recited in claim 14, wherein said calculating of the time difference of arrival further comprises calculating a Euclidian distance from said base stations to said transmitting device.

[c16]

16. A method for the determination of a mobile transmitting device, as recited in claim 14, wherein said calculating of the time difference of arrival further comprises accounting for noise in the system.

[c17]

17. A method for the determination of a mobile transmitting device, as recited in claim 14, wherein said calculating of the time difference of arrival further comprises calculating a Euclidian distance between said transmitting device and said base stations.

[c18]

18. A method for the determination of a mobile transmitting device, as recited in claim 17, wherein said calculating of the time difference of arrival further comprises triangulating a location of said transmitting device from a plurality of distances between said transmitting device and said plurality of base stations.

[c19]

19. A method for the determination of a mobile transmitting device, as recited in claim 14, wherein said calculating of the time difference of arrival further comprises correcting for errors.

[c20]

20. A method for the determination of a mobile transmitting device, as recited in claim 17, wherein said Euclidian distances are three dimensional distances.